
Chapter 2

I/I Pilot Project Selection

This chapter describes how the pilot projects were selected by local agencies, including the establishment of selection criteria, use of mini-basin flow data, project nomination, and voting results.

2.1 Selection Process Overview

Local agencies worked together to define pilot project selection criteria. Based on the criteria and flow information, each agency could then nominate candidate projects. The agencies convened within their three regions to review and forward projects to the whole committee, which selected the final 10. Major steps in this process are summarized in Table 2-1.

Table 2-1. Project Selection Steps

Date	Step
February 29, 2000	Local agency representatives identified potential pilot project selection criteria
April 25, 2000	Agreed on 10 pilot project selection criteria (see Section 2.4)
January and February 2002	King County and consultants identified mini-basins throughout the region with high rates of I/I, based on flow monitoring conducted during two wet seasons: (a) November 2000 to January 2001, and (b) November 2001 to January 2002
February 2002	Local agencies submitted pilot project candidates
March 13 and 19, 2002	Regional meetings held in the north, east, and south for local agency representatives to forward up to 10 project candidates for their region.
April 30, 2002	Local agencies selected final 10 regional pilot projects that best fit the 10 selection criteria

2.2 Egregious Basin Rehabilitation

In advance of the nomination process, the County solicited input from local agencies to identify possible I/I rehabilitation projects based on existing knowledge, flow monitoring by the agency, known illegal and direct connections, or egregious sources of I/I in their respective systems. Several agencies identified possible egregious I/I projects, which were subsequently proposed as pilot projects in the final nomination process.

2.3 Mini-Basin Flow Data

The initial means of identifying candidate projects was based on data collected during two periods of flow monitoring: (a) November 2000 to January 2001, and (b) November 2001 to January 2002. The flow meter data for over 700 mini-basins is documented in *2000/2001 Wet Weather Flow Monitoring* and *2001/2002 Wet Weather Flow Monitoring*. (Refer to Chapter 5 for a discussion of mini-basins.) These technical memoranda present hydrographs of the measured flows and estimates of the I/I rate in each basin for significant storms that occurred during the monitoring periods.

2.3.1 Hydrograph Flow Responses to Rainfall

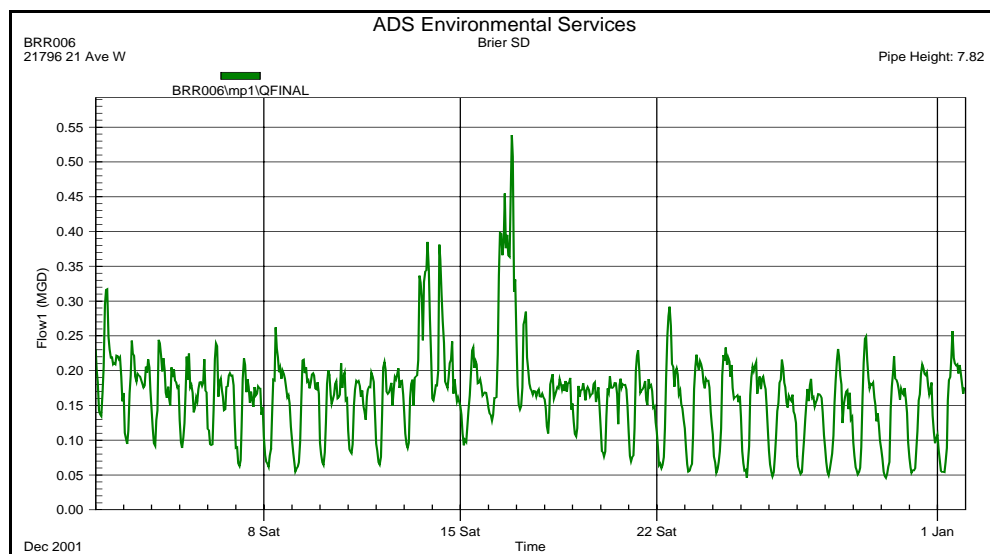
Distinct flow responses shown in the hydrographs suggested potential I/I sources. Identifying the various types of flow responses provided a means of subsequently nominating projects with a variety of I/I sources (see Table 2-2).

2.3.2 I/I Rates

A second piece of information used as a preliminary basis for nominating projects was the calculated I/I rate for each basin. The County's standard for excessive I/I is defined as any amount above 1,100 gallons per acre per day (gpad). As described in *2001/2002 Wet Weather Flow Monitoring*, over half the basins had estimated I/I rates above 2,500 gpad for at least one of the storms monitored during the flow-monitoring period. Some basins exhibited I/I rates over 15,000 gpad.

Table 2-2. Types of Flow Response to Rainfall

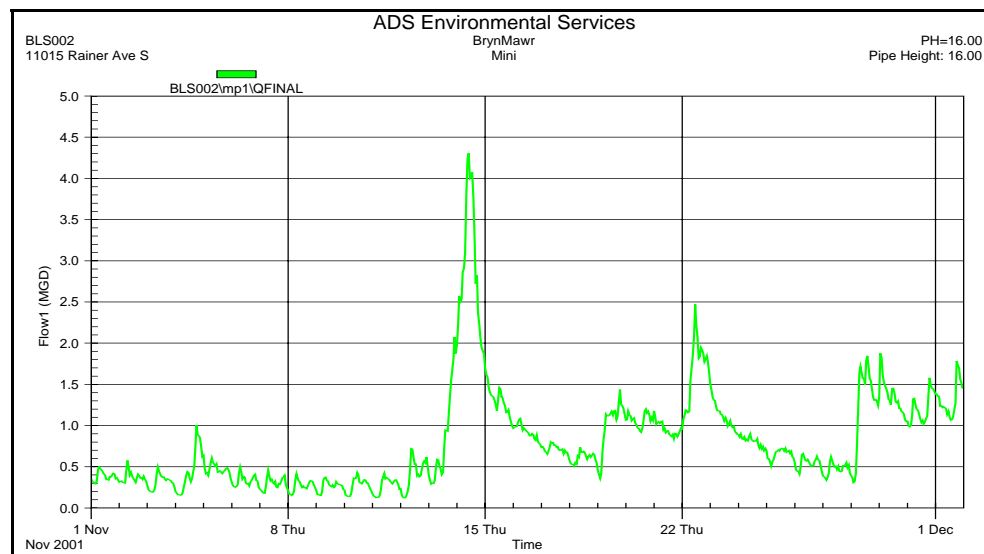
Response Type	Flow Characteristics in Response to Rainfall	Suggested Sources	Sample Hydrograph
Fast response	Sudden increase in flow	Inflow: catch basins, roof drains, or other direct connections; Infiltration: sources that respond rapidly to rainfall, such as shallow side sewers.	Figure 2-1
Rapid infiltration	Increase in flow during and/or shortly after a rainfall event, with gradual reduction in flow over a relatively short period after the event	Infiltration: shallow sources such as laterals, side sewers, foundation drains; and manholes and mains to a lesser extent	Figure 2-2
Slow infiltration	Slow increases in flow hours or days after a storm; increased flow may take several days or weeks after a storm to decline	Infiltration: deep sources such as manholes and mains; reflects a rising groundwater level	Figure 2-3



Source: 2001/2002 Wet Weather Flow Monitoring, June 2002

This hydrograph illustrates the fast response to the December 14 and 16, 2001 storms; City of Brier, Mini-basin BRR006. After the storm the flow returns quickly to the pre-storm rates.

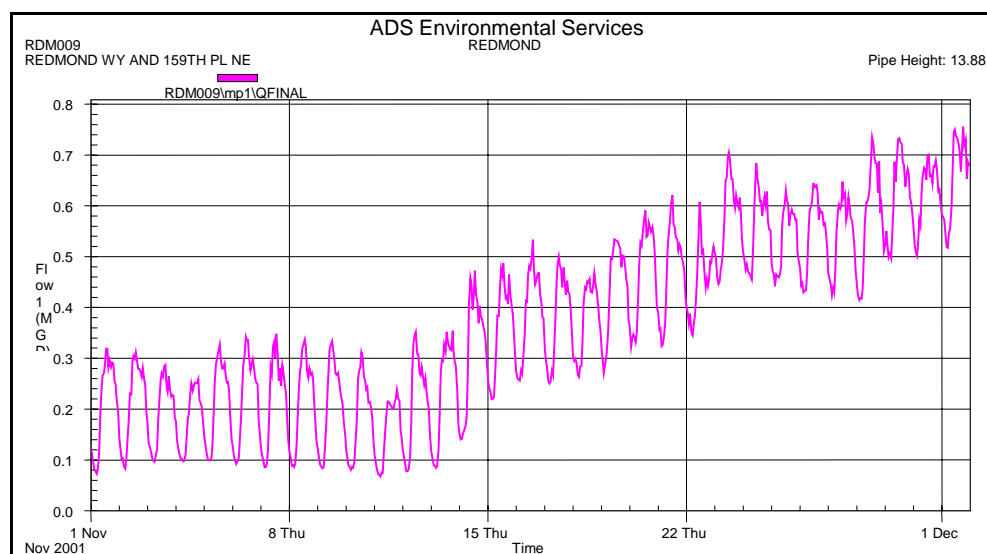
Figure 2-1. Fast Response Hydrograph



Source: 2001/2002 Wet Weather Flow Monitoring, June 2002

Response to November 14 and 22, 2001 storms; Skyway Sewer District (formerly Bryn Mawr – Lakeridge Sewer District), Mini-basin BLS002. This hydrograph illustrates both fast and slow infiltration response of flow to storms. The rapid infiltration response is seen in the slow decrease of flows.

Figure 2-2. Rapid Infiltration Response Hydrograph



Source: 2001/2002 Wet Weather Flow Monitoring, June 2002

Response to November 14, 2001 storm; City of Redmond, Mini-basin RDM009. There is no immediate response to the storm; however, the base flow in the system triples in the week following the storm.

Figure 2-3. Slow Infiltration Response Hydrograph

2.3.3 Preliminary Screening of Basin Flow Data

One purpose of the pilot projects was to collect data on the effectiveness of system rehabilitation in reducing I/I. Pre- and post-rehabilitation flow monitoring was used to quantify the reduction. Therefore, it was recognized before the selection process that good flow monitoring data should be available for mini-basins in which the nominated projects were located. The County recommended that agencies consider the following flow data characteristics when nominating projects:

- **The measured I/I rate for the mini-basin should be at least 2,500 gpad.** Because over half the drainage basins had I/I rates above 2,500 gpad, a basin with an I/I rate less than this would not be representative of the basins needing rehabilitation in a future I/I control program. In addition, documenting I/I reduction in a basin with an I/I rate less than 2,500 gpad could be difficult, and would not provide representative conclusions about the effectiveness of rehabilitation techniques.
- **Mini-basin flow data should be consistent and continuous during the two flow monitoring seasons used as the basis for selection.** Specific issues suggesting that a project should not be nominated included gaps in the mini-basin data due to meter malfunction, and flow pattern changes not reasonably attributable to rainfall or other documented system changes.
- **Preferably, the mini-basin should be an upstream basin rather than a flow-through basin.** During development of the flow-monitoring plan, flow data from many basins was quantified by subtracting flow from upstream-monitored basins. This increased the potential for error in measured flows.
- **The flow monitoring site for a pilot project candidate should not be influenced by an upstream constant-speed pump station.** Peak I/I rates are difficult to quantify with this type of a pump station because the measured flow is the pump rate, regardless of the flow through the system. During wet weather the duration of the pump cycle increases; however, the measured flow rate usually remains the same.

2.4 Selection Criteria

At a workshop with local agencies, the County queried agency representatives for ideas about criteria that should be used in selecting pilot projects. At a subsequent workshop, agency participants arrived at a consensus on the pilot project selection criteria. The 10 selection criteria were:

1. Provides geographic balance of pilot projects

It was expected that pilot projects would be chosen in three identified geographic areas of the King County service area: north, south, and east. The west region encompasses the City of Seattle, which was not involved in the pilot program.

2. Meets constructability time frame for the I/I program, including permitting needs

Due to time and budget constraints, extensive permitting processes were infeasible. While it was important to identify all potential projects, nominating projects with major permitting requirements was discouraged. It was expected that most selected projects would require no permitting other than State Environmental Policy Act (SEPA) checklists and local agency utility/street permits.

3. Considers differing geologic conditions/do no harm

It was important to consider differing geologic conditions; however, it was recognized that time and funding issues could preclude projects located in areas with complex geologic conditions. Some issues considered were:

- High groundwater: It was necessary to identify projects that addressed I/I caused by exposure to saturated soils, or that were located beneath water bodies such as a stream or creek.
- Unstable slopes: Projects that could increase slope stability concerns were avoided.
- Wetlands or other water bodies: Due to budget and time constraints, projects associated with wetlands or other water bodies were considered only if they did not require extensive permitting or have environmental concerns.

4. Provides environmental/public health benefits

Pilot projects that accomplished the following were considered:

- Enhanced streamflow: Increased streamflow in dry conditions (by removing groundwater and storm flows not removed by sewer lines), or decreased streamflow in wet conditions (by removing overflows)
- Reduced sewer overflows
- Benefited conditions related to the Endangered Species Act (ESA)
- Improved hazardous health areas: Removed conditions that result in exfiltration
- Reduced public impact: Minimized the effects of traffic disruption and noise

5. Addresses private sewer issues

Agencies wanted to select at least one pilot project that affected private property owners, including a project that addressed I/I on collection lines or side sewers. Private sewer aspects such as roof and foundation drains could be included.

6. Provides a regional impact

The agencies agreed that the location of selected projects should support assessment of basins tributary to planned new or expanded wastewater treatment collection or interceptor facilities. A pilot project might result in findings that would delay or reduce the need for those facilities.

7. Useful as a model for future I/I projects

Providing a sound basis for extrapolating I/I reduction results to the entire region was important.

8. Demonstrates variety of proven technologies and rehabilitation techniques

One purpose of the pilot projects was to demonstrate various I/I removal technologies and techniques. (See Chapter 4 for a description of the technologies and techniques considered for the pilot projects.)

9. Representative of typical I/I problems in the region

It was intended that the type of I/I experienced within the pilot projects be representative of I/I problems in the region.

10. The “Wild Card” criterion – project contributes to program goals but conditions were unanticipated during criteria development

During criteria development, the intention was that this criterion would provide flexibility in addressing unanticipated conditions. It allowed other issues to be considered during the selection process.

2.5 Pilot Project Nomination

Local agencies nominated pilot projects based on the selection criteria, flow data, and on the preliminary screening information. The agencies reviewed this information, and then used nomination forms to submit candidate projects. Nomination forms included: (1) information about the location of the candidate project, (2) the agency’s perception of the type of I/I that contributed to the system, (3) whether the agency intended the project to rehabilitate the system to reduce I/I on public or private property, and (4) the I/I rate as reported in *2001/2002 Wet Weather Flow Monitoring*. The nominating agency also documented whether or not and/or how the candidate project met each criterion. Agencies provided additional information about candidate projects, the sewer system’s approximate age, type of sewer construction materials, and if Sewer System Evaluation Survey (SSES) work could be quickly completed. Finally, nomination forms included hydrographs illustrating the flow response from the 2001/2002 flow-monitoring period. (See Appendix A for a copy of the nomination form.)

2.6 Intergovernmental Agreement (IGA)

In advance of pilot project selection, each nominating agency provided a letter to King County stating its intent to enter into an agreement with the County. This contractual agreement defined specific requirements for both parties.

During initial startup of the Regional I/I Control Program in 1999, each agency entered into an Agreement, which, in part, allowed the County, its consultants, and contractors to work within the agency’s local sewer system. Agencies with a selected pilot project in their system amended the agreement. The amendment covered:

- Specifics on sharing current information, reports, and records following SSES
- Pre- and post-construction flow data
- Modeling of the system
- Definition of scope
- Schedule and location
- Project management
- Financial provisions

The amendment also covered record keeping, community outreach, and environmental review. Amendments were tailored to meet each agency's specific needs.

2.7 Final Pilot Project Selection

Agency representatives attended their regional meetings in the north, east, and south to select up to 10 candidate projects from their region. A list of 66 candidates was reviewed then reduced to 29 at these meetings. The 29 candidate projects are summarized in Table 2-3.

Between the regional meetings in March and April 2002, the list of candidate projects was reduced from 29 to 23. Bellevue withdrew BEL042 and Ronald withdrew RON025. Soos Creek withdrew both of its candidates (SOO002 and SOO029). Coal Creek, Northshore, and Val Vue agreed to combine CCR002, NUD038, and VAL019 into a single candidate project focused on manholes. Locations of the initial candidate pilot projects are shown in Figure 2-4.

In April, local agency representatives reviewed the project selection criteria, proposed pilot basins/projects, and reached agreement on a maximum of 10 pilot projects/basins, not to exceed a construction value of \$9 million.

Table 2-3. Candidate Pilot Projects

Pilot Project Candidate Agency	Geographic Region	Mini-basin Meter Number	Measured I/I Rate (gpad)
Auburn	South	ABN002	10,030
Bellevue	East	BEL042 ¹	9,314
Bellevue	East	BEL077	7,342
Black Diamond	South	BLA001	3,311
Bothell	North	BOT004	5,938
Bothell	North	BOT011	2,947
Brier	North	BRR004	6,338
Brier	North	BRR006	2,408
Coal Creek	East	CCR002 ²	4,202
Issaquah	East	ISS014	3,572
Kent	South	KNT014	7,709
Kirkland	East	KRK006	6,745
Kirkland	East	KRK011	7,289
Lake Forest Park	North	RON041	7,962
Mercer Island	East	MRC012	13,719
Mercer Island	East	MRPS24	2,797
Northshore	North	NUD024	2,860
Northshore	North	NUD038 ²	6,025
Pacific/Algona	South	PAC005	4,320
Redmond	East	RDM009	5,250
Renton	South	RNT021	4,355
Ronald	North	RON002	11,279
Ronald	North	RON025 ¹	4,105
Ronald	North	RON032	7,303
Skyway (Bryn Mawr)	South	BLS002	27,167
Soos Creek	South	SOO002 ¹	7,688
Soos Creek	South	SOO029 ¹	7,220
Val Vue	South	VAL016	3,726
Val Vue	South	VAL019 ²	4,307

¹Agencies subsequently chose to withdraw these nominations.

²These projects were combined into one.

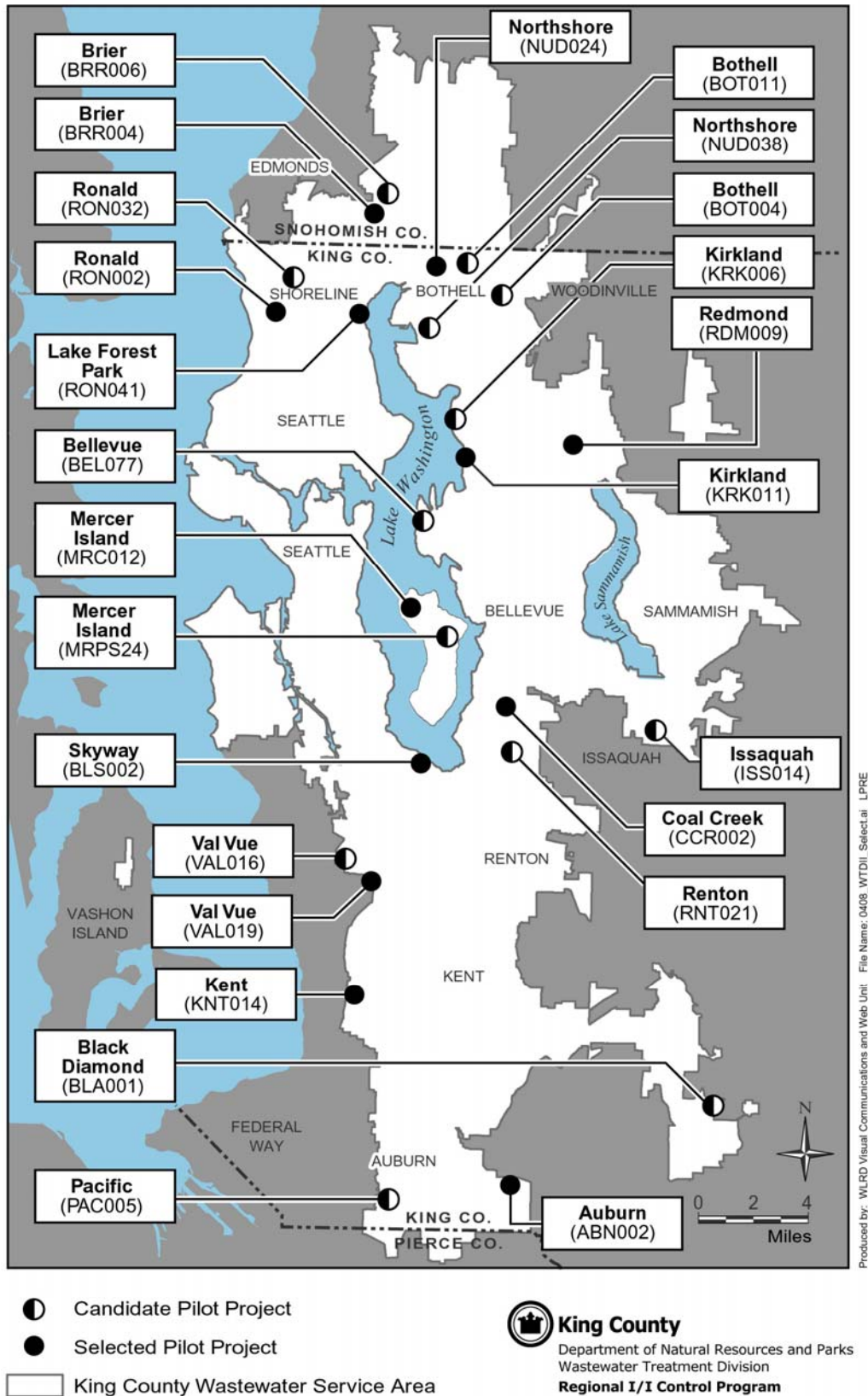


Figure 2-4. Initial Candidate Pilot Projects

2.7.1 Selection Process

Each local agency and workshop attendee received a copy of the completed nomination forms in advance of their workshop (see Appendix A). A presentation board for each candidate project was available at the workshop. Each agency had one voting representative who could vote for 10 separate projects. The final selection process consisted of the following steps:

1. Presentation of the regional selected projects

Local agencies provided additional comments and input about their candidates, including whether or not the agency would contribute additional funding for the rehabilitation improvements. An agency cited its preference if it had two or more projects under consideration.

2. Open session with “poster” presentation of proposed pilot projects

Agency representatives of the candidate project and program representatives discussed the proposed project with individuals.

3. Voting for pilot projects

Representatives voted for projects. To ensure that private property projects were selected, representatives were to vote for at least two proposed private property projects.

4. Voting results compiled and top 10 presented

After voting, the compiled results were presented to workshop attendees.

5. Alternative list of next 5 to be considered for inclusion in top 10

Alternatives were selected in case any of the top 10 pilot projects could not be constructed. Ultimately, six alternatives were selected, two per region.

6. Confirm criteria were met

Workshop attendees discussed the final list of pilot projects in an open forum to gain consensus that selection criteria had been met for top 10 pilot projects.

7. Finalize list

The workshop attendees arrived at a consensus.

2.7.2 Pilot Project Voting Results

The final voting tally is summarized in Table 2-4. The 10 candidates with the highest number of votes were identified as the pilot projects. Following selection of 10 pilot projects, voting representatives selected alternate candidates from the remaining list in the event that one of the 10 projects could not be executed. Two alternate candidate projects from each region (north, east, and south) were selected, as shown in Table 2-4.

Table 2-4. Voting Results

Pilot Project Candidate (Mini-basin Meter No.)	Geographic Region	Number of Votes	Status
Manhole Project (Coal Creek / Northshore / Val Vue) (CCR002 / NUD038 / VAL019)	East / North / South	26	Selected
Skyway (BLS002)	South	24	Selected
Ronald (RON002)	North	24	Selected
Mercer Island (MRC012)	East	20	Selected
Brier (BRR004)	North	19	Selected
Kirkland (KRK011)	East	17	Selected
Redmond (RDM009)	East	17	Selected
Lake Forest Park (RON041)	North	16	Selected
Auburn (ABN002)	South	15	Selected
Kent (KNT014)	South	13	Selected
Bellevue (BEL077)	East	10	1st East Region Alternate
Pacific/Algona (PAC005)	South	9	2nd South Region Alternate
Renton (RNT021)	South	9	1st South Region Alternate
Issaquah (ISS014)	East	9	2nd East Region Alternate
Val Vue (VAL016)	South	8	
Black Diamond (BLA001)	South	7	
Kirkland (KRK006)	East	7	
Bothell (BOT004)	North	6	1st North Region Alternate
Bothell (BOT011)	North	5	2nd North Region Alternate
Mercer Island (MRPS24)	East	4	
Northshore (NUD024)	North	4	
Ronald (RON032)	North	4	
Brier (BRR006)	North	2	